

**Work Paper WPSCREL0022**  
**Revision 0**

**Southern California Edison Company**  
**Design & Engineering Services**

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**Integral (Screw-In)  
Compact Fluorescent  
Lamp (CFL) –  
Non-Residential**

**September 18, 2007**

## At a Glance Summary

<b>Measure Description</b>	Screw-in Compact Fluorescent Lamps Nonresidential , upstream
<b>Savings Impacts Common Units</b>	kWh/unit
<b>Customer Base Case Description</b>	Incandescent Lamp
<b>Code Base Case Description</b>	Screw-in Compact Fluorescent Lamp
<b>Costs Common Units</b>	Lamp
<b>Measure Equipment Cost (\$/unit)</b>	Various – See table below
<b>Measure Incremental Cost (\$/unit)</b>	Various – See table below
<b>Measure Installed Cost (\$/unit)</b>	Various – Same as Equipment Cost
<b>Measure Load Shape</b>	Indoor Lt
<b>Effective Useful Life (years)</b>	2.1 years
<b>Program Type:</b>	Replace on Burnout (ROB)
<b>TOU AC Adjustment</b>	0%
<b>Net-to-Gross Ratio</b>	75% (Subject to completion of the study referenced in this work paper and in accordance with any direction provided by the Commission in the final decision on energy efficiency incentives)
<b>Building Type</b>	Miscellaneous Commercial
<b>Building Vintage</b>	All
<b>Climate Zone</b>	All
<b>Important Comments</b>	Values in the “At a Glance Summary” table below are rounded representations of full decimal values. The full values will be used when calculating program results for reporting purposes.

Work Paper RunID: WPSCRELG0022.0-	Measure Name	Customer Annual Electric Savings (kWh/unit)	Customer Peak Electric Demand Reduction (kW/unit)	Above Code Annual Electric Savings (kWh/unit)	Above Code Peak Electric Demand Reduction (kW/unit)	Measure Equipment Cost (\$/unit)	Measure Incremental Cost (\$/unit)
001	Screw-in CFL 5 Watt <450 Lumens (Nonres.)	59.4	0.015	59.4	0.015	\$4.98	\$4.40
002	Screw-in CFL 7 Watt 450 to 799 Lumens (Nonres.)	97.9	0.024	97.9	0.024	\$4.98	\$4.40
003	Screw-in CFL 9 Watt 450 to 799 Lumens (Nonres.)	92.0	0.023	92.0	0.023	\$4.98	\$4.40
004	Screw-in CFL 10 Watt <450 Lumens (Nonres.)	44.5	0.011	44.5	0.011	\$4.98	\$4.40
005	Screw-in CFL 10 Watt 450 to 799 Lumens (Nonres.)	89.0	0.022	89.0	0.022	\$4.98	\$4.40
006	Screw-in CFL 10 Watt 800 to 1,099 Lumens (Nonres.)	148.4	0.036	148.4	0.036	\$4.87	\$4.26
007	Screw-in CFL 11 Watt <450 Lumens (Nonres.)	41.6	0.010	41.6	0.010	\$4.98	\$4.40
008	Screw-in CFL 11 Watt 450 to 799 Lumens (Nonres.)	86.1	0.021	86.1	0.021	\$4.98	\$4.40
009	Screw-in CFL 11 Watt 800 to 1,099 Lumens (Nonres.)	145.4	0.036	145.4	0.036	\$4.87	\$4.26
010	Screw-in CFL 12 Watt <450 Lumens (Nonres.)	38.6	0.009	38.6	0.009	\$4.98	\$4.40
011	Screw-in CFL 12 Watt 450 to 799 Lumens (Nonres.)	83.1	0.020	83.1	0.020	\$4.98	\$4.40
012	Screw-in CFL 12 Watt 800 to 1,099 Lumens (Nonres.)	142.5	0.035	142.5	0.035	\$4.87	\$4.26
013	Screw-in CFL 13 Watt <450 Lumens (Nonres.)	35.6	0.009	35.6	0.009	\$4.98	\$4.40
014	Screw-in CFL 13 Watt 450 to 799 Lumens (Nonres.)	80.1	0.020	80.1	0.020	\$4.98	\$4.40
015	Screw-in CFL 13 Watt 800 to 1,099 Lumens (Nonres.)	139.5	0.034	139.5	0.034	\$4.87	\$4.26
016	Screw-in CFL 14 Watt 450 to 799 Lumens (Nonres.)	77.2	0.019	77.2	0.019	\$5.25	\$4.64

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017	Screw-in CFL 14 Watt 800 to 1,099 Lumens (Nonres.)	136.5	0.033	136.5	0.033	\$5.25	\$4.64
018	Screw-in CFL 15 Watt 450 to 799 Lumens (Nonres.)	74.2	0.018	74.2	0.018	\$5.62	\$5.01
019	Screw-in CFL 15 Watt 800 to 1,099 Lumens (Nonres.)	133.6	0.033	133.6	0.033	\$5.62	\$5.01
020	Screw-in CFL 15 Watt 1,100 to 1,399 Lumens (Nonres.)	178.1	0.044	178.1	0.044	\$5.62	\$5.01
021	Screw-in CFL 16 Watt 800 to 1,099 Lumens (Nonres.)	130.6	0.032	130.6	0.032	\$6.00	\$5.39
022	Screw-in CFL 16 Watt 1,100 to 1,399 Lumens (Nonres.)	175.1	0.043	175.1	0.043	\$6.00	\$5.39
023	Screw-in CFL 17 Watt 450 to 799 Lumens (Nonres.)	68.3	0.017	68.3	0.017	\$6.74	\$6.14
024	Screw-in CFL 17 Watt 800 to 1,099 Lumens (Nonres.)	127.6	0.031	127.6	0.031	\$6.74	\$6.14
025	Screw-in CFL 17 Watt 1,100 to 1,399 Lumens (Nonres.)	172.1	0.042	172.1	0.042	\$6.37	\$6.14
026	Screw-in CFL 18 Watt 450 to 799 Lumens (Nonres.)	65.3	0.016	65.3	0.016	\$6.74	\$6.14
027	Screw-in CFL 18 Watt 800 to 1,099 Lumens (Nonres.)	124.7	0.031	124.7	0.031	\$6.74	\$6.14
028	Screw-in CFL 18 Watt 1,100 to 1,399 Lumens (Nonres.)	169.2	0.041	169.2	0.041	\$6.37	\$5.77
029	Screw-in CFL 19 Watt 450 to 799 Lumens (Nonres.)	62.3	0.015	62.3	0.015	\$6.73	\$6.12
030	Screw-in CFL 19 Watt 800 to 1,099 Lumens (Nonres.)	121.7	0.030	121.7	0.030	\$6.73	\$6.12
031	Screw-in CFL 19 Watt 1,100 to 1,399 Lumens (Nonres.)	166.2	0.041	166.2	0.041	\$6.73	\$6.12
032	Screw-in CFL 20 Watt 800 to 1,099 Lumens	118.7	0.029	118.7	0.029	\$7.08	\$6.47

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	(Nonres.)						
033	Screw-in CFL 20 Watt 1,100 to 1,399 Lumens (Nonres.)	163.2	0.040	163.2	0.040	\$7.08	\$6.47
034	Screw-in CFL 21 Watt 800 to 1,099 Lumens (Nonres.)	115.7	0.028	115.7	0.028	\$6.66	\$6.05
035	Screw-in CFL 21 Watt 1,100 to 1,399 Lumens (Nonres.)	160.3	0.039	160.3	0.039	\$6.66	\$6.05
036	Screw-in CFL 22 Watt 800 to 1,099 Lumens (Nonres.)	112.8	0.028	112.8	0.028	\$6.66	\$6.05
037	Screw-in CFL 22 Watt 1,100 to 1,399 Lumens (Nonres.)	157.3	0.039	157.3	0.039	\$6.66	\$6.05
038	Screw-in CFL 23 Watt 800 to 1,099 Lumens (Nonres.)	109.8	0.027	109.8	0.027	\$6.66	\$6.05
039	Screw-in CFL 23 Watt 1,100 to 1,399 Lumens (Nonres.)	154.3	0.038	154.3	0.038	\$6.66	\$6.05
040	Screw-in CFL 23 Watt 1,400 to 1,599 Lumens (Nonres.)	198.9	0.049	198.9	0.049	\$6.66	\$6.05
041	Screw-in CFL 23 Watt 1,600 to 1,999 Lumens (Nonres.)	228.5	0.056	228.5	0.056	\$6.66	\$6.05
042	Screw-in CFL 24 Watt 800 to 1,099 Lumens (Nonres.)	106.8	0.026	106.8	0.026	\$8.85	\$6.63
043	Screw-in CFL 24 Watt 1,100 to 1,399 Lumens (Nonres.)	151.4	0.037	151.4	0.037	\$7.24	\$6.63
044	Screw-in CFL 24 Watt 1,400 to 1,599 Lumens (Nonres.)	195.9	0.048	195.9	0.048	\$7.24	\$6.63
045	Screw-in CFL 24 Watt 1,600 to 1,999 Lumens (Nonres.)	225.6	0.055	225.6	0.055	\$7.24	\$6.63
046	Screw-in CFL 25 Watt 800 to 1,099 Lumens (Nonres.)	103.9	0.025	103.9	0.025	\$8.85	\$6.63
047	Screw-in CFL 25 Watt 1,100 to 1,399 Lumens (Nonres.)	148.4	0.036	148.4	0.036	\$7.24	\$6.63

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048	Screw-in CFL 25 Watt 1,400 to 1,599 Lumens (Nonres.)	192.9	0.047	192.9	0.047	\$7.24	\$6.63
049	Screw-in CFL 25 Watt 1,600 to 1,999 Lumens (Nonres.)	222.6	0.055	222.6	0.055	\$7.24	\$6.63
050	Screw-in CFL 26 Watt 800 to 1,099 Lumens (Nonres.)	100.9	0.025	100.9	0.025	\$9.21	\$6.92
051	Screw-in CFL 26 Watt 1,100 to 1,399 Lumens (Nonres.)	145.4	0.036	145.4	0.036	\$7.52	\$6.92
052	Screw-in CFL 26 Watt 1,400 to 1,599 Lumens (Nonres.)	189.9	0.047	189.9	0.047	\$7.52	\$6.92
053	Screw-in CFL 26 Watt 1,600 to 1,999 Lumens (Nonres.)	219.6	0.054	219.6	0.054	\$7.52	\$6.92
054	Screw-in CFL 27 Watt 800 to 1,099 Lumens (Nonres.)	97.9	0.024	97.9	0.024	\$8.10	\$7.50
055	Screw-in CFL 27 Watt 1,100 to 1,399 Lumens (Nonres.)	142.5	0.035	142.5	0.035	\$8.10	\$7.50
056	Screw-in CFL 27 Watt 1,400 to 1,599 Lumens (Nonres.)	187.0	0.046	187.0	0.046	\$8.10	\$7.50
057	Screw-in CFL 27 Watt 1,600 to 1,999 Lumens (Nonres.)	216.7	0.053	216.7	0.053	\$8.10	\$7.50
058	Screw-in CFL 28 Watt 1,100 to 1,399 Lumens (Nonres.)	139.5	0.034	139.5	0.034	\$8.10	\$7.50
059	Screw-in CFL 28 Watt 1,400 to 1,599 Lumens (Nonres.)	184.0	0.045	184.0	0.045	\$8.10	\$7.50
060	Screw-in CFL 28 Watt 1,600 to 1,999 Lumens (Nonres.)	213.7	0.052	213.7	0.052	\$8.10	\$7.50
061	Screw-in CFL 29 Watt 1,100 to 1,399 Lumens (Nonres.)	136.5	0.033	136.5	0.033	\$9.26	\$8.65
062	Screw-in CFL 29 Watt 1,400 to 1,599 Lumens (Nonres.)	181.0	0.044	181.0	0.044	\$9.26	\$8.65
063	Screw-in CFL 29 Watt 1,600 to 1,999 Lumens	210.7	0.052	210.7	0.052	\$9.26	\$8.65

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	(Nonres.)						
064	Screw-in CFL 30 Watt 1,100 to 1,399 Lumens (Nonres.)	133.6	0.033	133.6	0.033	\$9.26	\$8.65
065	Screw-in CFL 30 Watt 1,400 to 1,599 Lumens (Nonres.)	178.1	0.044	178.1	0.044	\$9.26	\$8.65
066	Screw-in CFL 30 Watt 1,600 to 1,999 Lumens (Nonres.)	207.8	0.051	207.8	0.051	\$9.26	\$8.65
067	Screw-in CFL 30 Watt 2,000 to 2,599 Lumens (Nonres.)	267.1	0.065	267.1	0.065	\$9.26	\$8.65
068	Screw-in CFL 31 Watt 1,100 to 1,399 Lumens (Nonres.)	130.6	0.032	130.6	0.032	\$9.19	\$6.97
069	Screw-in CFL 31 Watt 1,400 to 1,599 Lumens (Nonres.)	175.1	0.043	175.1	0.043	\$9.19	\$6.97
070	Screw-in CFL 31 Watt 1,600 to 1,999 Lumens (Nonres.)	204.8	0.050	204.8	0.050	\$9.19	\$6.97
071	Screw-in CFL 32 Watt 1,100 to 1,399 Lumens (Nonres.)	127.6	0.031	127.6	0.031	\$9.19	\$6.97
072	Screw-in CFL 32 Watt 1,400 to 1,599 Lumens (Nonres.)	172.1	0.042	172.1	0.042	\$9.19	\$6.97
073	Screw-in CFL 32 Watt 1,600 to 1,999 Lumens (Nonres.)	201.8	0.049	201.8	0.049	\$9.19	\$6.97
074	Screw-in CFL 33 Watt 1,100 to 1,399 Lumens (Nonres.)	124.7	0.031	124.7	0.031	\$9.19	\$6.97
075	Screw-in CFL 33 Watt 1,400 to 1,599 Lumens (Nonres.)	169.2	0.041	169.2	0.041	\$9.19	\$6.97
076	Screw-in CFL 33 Watt 1,600 to 1,999 Lumens (Nonres.)	198.9	0.049	198.9	0.049	\$9.19	\$6.97
077	Screw-in CFL 34 Watt 1,100 to 1,399 Lumens (Nonres.)	121.7	0.030	121.7	0.030	\$9.19	\$6.97
078	Screw-in CFL 34 Watt 1,400 to 1,599 Lumens (Nonres.)	166.2	0.041	166.2	0.041	\$9.19	\$6.97

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079	Screw-in CFL 34 Watt 1,600 to 1,999 Lumens (Nonres.)	195.9	0.048	195.9	0.048	\$9.19	\$6.97
080	Screw-in CFL 35 Watt 1,400 to 1,599 Lumens (Nonres.)	163.2	0.040	163.2	0.040	\$9.19	\$6.97
081	Screw-in CFL 35 Watt 1,600 to 1,999 Lumens (Nonres.)	192.9	0.047	192.9	0.047	\$9.19	\$6.97
082	Screw-in CFL 35 Watt 2,000 to 2,599 Lumens (Nonres.)	252.3	0.062	252.3	0.062	\$9.19	\$6.97
083	Screw-in CFL 36 Watt 1,400 to 1,599 Lumens (Nonres.)	160.3	0.039	160.3	0.039	\$9.19	\$6.97
084	Screw-in CFL 36 Watt 1,600 to 1,999 Lumens (Nonres.)	189.9	0.047	189.9	0.047	\$9.19	\$6.97
085	Screw-in CFL 36 Watt 2,000 to 2,599 Lumens (Nonres.)	249.3	0.061	249.3	0.061	\$9.19	\$6.97
086	Screw-in CFL 37 Watt 1,400 to 1,599 Lumens (Nonres.)	157.3	0.039	157.3	0.039	\$12.77	\$10.55
087	Screw-in CFL 37 Watt 1,600 to 1,999 Lumens (Nonres.)	187.0	0.046	187.0	0.046	\$12.77	\$10.55
088	Screw-in CFL 37 Watt 2,000 to 2,599 Lumens (Nonres.)	246.3	0.060	246.3	0.060	\$12.77	\$10.55
089	Screw-in CFL 38 Watt 1,400 to 1,599 Lumens (Nonres.)	154.3	0.038	154.3	0.038	\$12.77	\$10.55
090	Screw-in CFL 38 Watt 1,600 to 1,999 Lumens (Nonres.)	184.0	0.045	184.0	0.045	\$12.77	\$10.55
091	Screw-in CFL 38 Watt 2,000 to 2,599 Lumens (Nonres.)	243.4	0.060	243.4	0.060	\$12.77	\$10.55
092	Screw-in CFL 38 Watt 2,600 to 3,599 Lumens (Nonres.)	332.4	0.081	332.4	0.081	\$12.77	\$10.55
093	Screw-in CFL 39 Watt 1,400 to 1,599 Lumens (Nonres.)	151.4	0.037	151.4	0.037	\$12.77	\$10.55
094	Screw-in CFL 39 Watt 1,600 to 1,999 Lumens	181.0	0.044	181.0	0.044	\$12.77	\$10.55

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	(Nonres.)						
095	Screw-in CFL 39 Watt 2,000 to 2,599 Lumens (Nonres.)	240.4	0.059	240.4	0.059	\$12.77	\$10.55
096	Screw-in CFL 39 Watt 2,600 to 3,599 Lumens (Nonres.)	329.4	0.081	329.4	0.081	\$12.77	\$10.55
097	Screw-in CFL 40 Watt 1,600 to 1,999 Lumens (Nonres.)	178.1	0.044	178.1	0.044	\$12.77	\$10.55
098	Screw-in CFL 40 Watt 2,000 to 2,599 Lumens (Nonres.)	237.4	0.058	237.4	0.058	\$12.77	\$10.55
099	Screw-in CFL 40 Watt 2,600 to 3,599 Lumens (Nonres.)	326.5	0.080	326.5	0.080	\$12.77	\$10.55
100	Screw-in CFL 41 Watt 1,600 to 1,999 Lumens (Nonres.)	175.1	0.043	175.1	0.043	\$12.77	\$10.55
101	Screw-in CFL 41 Watt 2,000 to 2,599 Lumens (Nonres.)	234.5	0.057	234.5	0.057	\$12.77	\$10.55
102	Screw-in CFL 41 Watt 2,600 to 3,599 Lumens (Nonres.)	323.5	0.079	323.5	0.079	\$12.77	\$10.55
103	Screw-in CFL 42 Watt 1,600 to 1,999 Lumens (Nonres.)	172.1	0.042	172.1	0.042	\$12.77	\$10.55
104	Screw-in CFL 42 Watt 2,000 to 2,599 Lumens (Nonres.)	231.5	0.057	231.5	0.057	\$12.77	\$10.55
105	Screw-in CFL 42 Watt 2,600 to 3,599 Lumens (Nonres.)	320.5	0.078	320.5	0.078	\$12.77	\$10.55
106	Screw-in CFL 43 Watt 1,600 to 1,999 Lumens (Nonres.)	169.2	0.041	169.2	0.041	\$12.77	\$10.55
107	Screw-in CFL 43 Watt 2,000 to 2,599 Lumens (Nonres.)	228.5	0.056	228.5	0.056	\$12.77	\$10.55
108	Screw-in CFL 43 Watt 2,600 to 3,599 Lumens (Nonres.)	317.6	0.078	317.6	0.078	\$12.77	\$10.55
109	Screw-in CFL 44 Watt 1,600 to 1,999 Lumens (Nonres.)	166.2	0.041	166.2	0.041	\$12.77	\$10.55

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110	Screw-in CFL 44 Watt 2,000 to 2,599 Lumens (Nonres.)	225.6	0.055	225.6	0.055	\$12.77	\$10.55
111	Screw-in CFL 44 Watt 2,600 to 3,599 Lumens (Nonres.)	314.6	0.077	314.6	0.077	\$12.77	\$10.55
112	Screw-in CFL 45 Watt 1,600 to 1,999 Lumens (Nonres.)	163.2	0.040	163.2	0.040	\$12.77	\$10.55
113	Screw-in CFL 45 Watt 2,000 to 2,599 Lumens (Nonres.)	222.6	0.055	222.6	0.055	\$12.77	\$10.55
114	Screw-in CFL 45 Watt 2,600 to 3,599 Lumens (Nonres.)	311.6	0.076	311.6	0.076	\$12.77	\$10.55
115	Screw-in CFL 46 Watt 1,600 to 1,999 Lumens (Nonres.)	160.3	0.039	160.3	0.039	\$12.77	\$10.55
116	Screw-in CFL 46 Watt 2,000 to 2,599 Lumens (Nonres.)	219.6	0.054	219.6	0.054	\$12.77	\$10.55
117	Screw-in CFL 46 Watt 2,600 to 3,599 Lumens (Nonres.)	308.7	0.076	308.7	0.076	\$12.77	\$10.55
118	Screw-in CFL 47 Watt 1,600 to 1,999 Lumens (Nonres.)	157.3	0.039	157.3	0.039	\$12.77	\$10.55
119	Screw-in CFL 47 Watt 2,000 to 2,599 Lumens (Nonres.)	216.7	0.053	216.7	0.053	\$12.77	\$10.55
120	Screw-in CFL 47 Watt 2,600 to 3,599 Lumens (Nonres.)	305.7	0.075	305.7	0.075	\$12.77	\$10.55
121	Screw-in CFL 48 Watt 1,600 to 1,999 Lumens (Nonres.)	154.3	0.038	154.3	0.038	\$12.77	\$10.55
122	Screw-in CFL 48 Watt 2,000 to 2,599 Lumens (Nonres.)	213.7	0.052	213.7	0.052	\$12.77	\$10.55
123	Screw-in CFL 48 Watt 2,600 to 3,599 Lumens (Nonres.)	302.7	0.074	302.7	0.074	\$12.77	\$10.55
124	Screw-in CFL 49 Watt 1,600 to 1,999 Lumens (Nonres.)	151.4	0.037	151.4	0.037	\$12.77	\$10.55
125	Screw-in CFL 49 Watt 2,000 to 2,599 Lumens	210.7	0.052	210.7	0.052	\$12.77	\$10.55

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	(Nonres.)						
126	Screw-in CFL 49 Watt 2,600 to 3,599 Lumens (Nonres.)	299.8	0.073	299.8	0.073	\$12.77	\$10.55
127	Screw-in CFL 50 Watt 2,000 to 2,599 Lumens (Nonres.)	207.8	0.051	207.8	0.051	\$12.77	\$10.55
128	Screw-in CFL 50 Watt 2,600 to 3,599 Lumens (Nonres.)	296.8	0.073	296.8	0.073	\$12.77	\$10.55
129	Screw-in CFL 50 Watt 3,600 to 4,599 Lumens (Nonres.)	445.2	0.109	445.2	0.109	\$12.77	\$10.55
130	Screw-in CFL 51 Watt 2,000 to 2,599 Lumens (Nonres.)	204.8	0.050	204.8	0.050	\$12.77	\$10.55
131	Screw-in CFL 51 Watt 2,600 to 3,599 Lumens (Nonres.)	293.8	0.072	293.8	0.072	\$12.77	\$10.55
132	Screw-in CFL 51 Watt 3,600 to 4,599 Lumens (Nonres.)	442.2	0.108	442.2	0.108	\$12.77	\$10.55
133	Screw-in CFL 52 Watt 2,000 to 2,599 Lumens (Nonres.)	201.8	0.049	201.8	0.049	\$12.77	\$10.55
134	Screw-in CFL 52 Watt 2,600 to 3,599 Lumens (Nonres.)	290.9	0.071	290.9	0.071	\$12.77	\$10.55
135	Screw-in CFL 52 Watt 3,600 to 4,599 Lumens (Nonres.)	439.3	0.108	439.3	0.108	\$12.77	\$10.55
136	Screw-in CFL 53 Watt 2,000 to 2,599 Lumens (Nonres.)	198.9	0.049	198.9	0.049	\$12.77	\$10.55
137	Screw-in CFL 53 Watt 2,600 to 3,599 Lumens (Nonres.)	287.9	0.070	287.9	0.070	\$12.77	\$10.55
138	Screw-in CFL 53 Watt 3,600 to 4,599 Lumens (Nonres.)	436.3	0.107	436.3	0.107	\$12.77	\$10.55
139	Screw-in CFL 54 Watt 2,000 to 2,599 Lumens (Nonres.)	195.9	0.048	195.9	0.048	\$12.77	\$10.55
140	Screw-in CFL 54 Watt 2,600 to 3,599 Lumens (Nonres.)	284.9	0.070	284.9	0.070	\$12.77	\$10.55

Work Paper RunID: WPSCRELG0022.0-	Measure Name	Customer Annual Electric Savings (kWh/unit)	Customer Peak Electric Demand Reduction (kW/unit)	Above Code Annual Electric Savings (kWh/unit)	Above Code Peak Electric Demand Reduction (kW/unit)	Measure Equipment Cost (\$/unit)	Measure Incremental Cost (\$/unit)
141	Screw-in CFL 54 Watt 3,600 to 4,599 Lumens (Nonres.)	433.3	0.106	433.3	0.106	\$12.77	\$10.55
142	Screw-in CFL 55 Watt 2,000 to 2,599 Lumens (Nonres.)	192.9	0.047	192.9	0.047	\$12.77	\$10.55
143	Screw-in CFL 55 Watt 2,600 to 3,599 Lumens (Nonres.)	282.0	0.069	282.0	0.069	\$12.77	\$10.55
144	Screw-in CFL 55 Watt 3,600 to 4,599 Lumens (Nonres.)	430.3	0.105	430.3	0.105	\$12.77	\$10.55

## Document Revision History

Revision 0	September 2007	<ul style="list-style-type: none"><li>• Split original work paper short form WPSCRELG0017.0 into CFL groups</li><li>• Expanded to final WP template format</li><li>• Measure equipment costs added</li><li>• Net to Gross Ration Reduced from 80% to 75% (Subject to completion of the study referenced in this work paper and in accordance with any direction provided by the Commission in the final decision on energy efficiency incentives)</li><li>• In Service Rate Changed from 90% to 92%</li></ul>
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**Note:** The information provided in this work paper was developed using the best available technical resources at the time this document was prepared.

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## Section 1. General Measure and Baseline Data

### 1.1 Measure Description and Background

A compact fluorescent lamp (CFL) consists of two main parts: a gas-filled tube and an electronic ballast. Electric current flows from the ballast through the gas, causing it to emit ultraviolet light. The ultraviolet light then excites a white phosphor coating on the inside of the tube, making it emit visible light. This measure replaces incandescent lamps. An incandescent lamp is also a source of artificial light that works through a different process known as incandescence. In the incandescent process an electrical current passes through a thin filament, heating it and causing it to become excited and release photons.

The fluorescent process is approximately four times more efficient at converting electricity into light. Modern CFLs typically have a life span of between 6,000 and 15,000 hours. CFL wattages covered by this work paper range in values from 5 watts through 55 watts with lumen ranges from under 450 lumens through 4,599 lumens replacing incandescent lamps with wattages that range from under 24 watts through 500 watts with matching lumen ranges.

The measures discussed in this work paper are integral (screw-in) compact fluorescent lamps.

### 1.2 DEER Differences Analysis

The Non-Residential Sector Non-Weather Sensitive section (Section 3) of the *2004-2005 Database for Energy Efficiency Resources (DEER) Update Study Final Report, December 2005 (Itron, 2005)*<sup>1</sup> contains the DEER methodology for calculating energy savings for screw-in compact fluorescent lamps (CFL) measures. A lumen equivalency table is also presented for compact fluorescent lamps (CFLs) that range from less than 13 watts through 40 watts that are mapped to incandescent wattages that range from a 40 Watt incandescent lamp through a 150 Watt incandescent lamp. The report does not present tables with a complete set of lighting savings estimates for all of the market sectors but, instead, explains their methodology, presents examples, and includes a table that contains interior lighting savings estimates for the primary school market sector under program delivery methods.

Two methodologies for calculating demand savings are presented in this section of the DEER report. A methodology for Standard Performance Contracts (SPC) which are considered to have strict measure verification requirements and second methodology for Express Efficiency which is considered to have limited or no measure verification requirements. The significant difference between the two methodologies is the inclusion of an installation rate adjustment factor in the Express Efficiency algorithm. The Express Efficiency methodology, which includes a downward adjustment factor installation rate, is used for the measures covered by this work paper and is discussed in greater detail in the following sections on demand and energy savings.

**Demand Savings:** The methodology presented in the DEER Report for the calculation of demand saving is based on several factors that include the calculation of wattage reductions resulting from replacing a base technology (incandescent lamp), matching the lumen output of the base technologies with the lumen output of a CFL measures, calculating the delta watts, then multiplying the result by an Installation Rate ( the equivalent of an In Service Rate in the

residential calculation) and Peak Coincidence Factor (the equivalent of a Peak Hour Load Share in the residential calculation) and applying an interactive effect<sup>2</sup> (Demand Interactive Effect from Table 3-2)<sup>3</sup>.

$$\text{Demand Savings} \left[ \frac{\text{Watts}}{\text{unit}} \right] = (\Delta \text{Watts} / \text{unit}) \times (\text{Installation Rate}) \times (\text{Peak Coincidence Factor}) \times (\text{Interactive Effects})$$

Below is an example calculation done for a 14W CFL screw-in lamp replacing a 60W incandescent base lamp.

Energy savings are calculated in DEER following a simple formula that captures wattage level changes, hours of daily use, and estimates of lamp installation rate identified as an In Service Rate.

$$\text{Energy Savings} \left[ \frac{\text{kWh}}{\text{unit} \cdot \text{year}} \right] = \frac{(\Delta \text{Watts} / \text{unit}) \times (\text{annual hours of use}) \times (\text{Installation Rate}) \times (\text{Interactive Effects})}{1,000 \text{ Watt hours} / \text{kWh}}$$

As presented in greater detail in Section 2 of this work paper, the methodology used to calculate energy and demand saving are the same as those used in the DEER Report subject to the modification discussed below.

**Interactive effects:** When more efficient light sources are installed, the wattage of new lamps is lower. This lower wattage produces less heat. The lower heat emissions result in cooler air and reduced air conditioning requirements. The purpose of including demand- and energy-interactive effects in the DEER calculation algorithm is to capture the energy and demand reductions from the avoided air conditioning load resulting from the reduction of internal heat gains produced by the more efficient lighting sources. The impact of accounting for these interactive effects is to increase calculated energy and demand savings by as much as 26% in some market types, based on the tables in the DEER Report. However, SCE is concerned that the interactive effects used in the DEER Report are not appropriate for these measures for the following reasons. The DEER interactive factors do not vary by climate zone and are not scalable to account for differences in air conditioning systems and operational differences. It is unclear if the interactive factor appropriately accounts for increases in heating requirements (including fan loads) which may offset some of these savings. It is also unclear if the interactive effects presented in DEER are appropriate for the small businesses that tend to participate in this type of program. Program participants tend to be small businesses, which may not use air conditioning to the extent necessary to produce the interactive effects that are presented in the DEER Report. It should be noted that the interactive effects presented in the DEER Report are the same for large customer types and small customer types. Due to these concerns, SCE does not use interactive effects in the calculation of energy and demand savings for the measures in this work paper.

**Effective Useful Life:** The Effective Useful Life (EUL) used for the measures in this work paper is based on the EUL for Small Retail from *Table 11-4: Non-Weather Sensitive – Lighting EULs* of the DEER Report<sup>4</sup>. This is a deviation from the methodology used for calculating the annual hours of operation and coincidence factors discussed above. This deviation is due to recent concern over the true operating hours of CFL that are being purchased under this program that

could impact the calculation of effective useful lives dictating a more conservative approach. Therefore, instead of using an EUL of 2.5 years based on the average EUL of the market sectors participating in the program [small retail, small office, and sit down restaurants], SCE uses an **EUL of 2.1 years**, which is the lowest effective useful life of these three market sectors, when calculating the energy and demand impact for the measures in this program.

**Installation Rate:** For the measures in this work paper as explained below in Section 1.4 on EM&V Market Potential, Edison has determined that the DEER installation Rate of 92% (0.92) that is used for Express Efficiency type programs that have limited or no measure verification requirements is more appropriate for these measures.

### 1.3 Codes and Standards Requirements Analysis

There are currently no known codes or standards applicable to this measure.

### 1.4 EM&V, Market Potential, and Other Studies

Although not directly applicable for nonresidential upstream lighting, the *2004/2005 Statewide Residential Retrofit Single-Family Energy Efficiency Rebate Evaluation* (Itron 2007)<sup>5</sup> examines the upstream lighting program through which bulbs are rebated. Sections 5 & 6 of this study provide an updated analysis of the upstream CFL program covered by this work paper. Itron gathered general energy efficiency data from a telephone survey (n=4,718), with a portion being asked in-depth questions about residential lighting (n=1000), an on-site inspection (n=100) and surveys of manufacturers and retailers.

**Delta Wattage Assumption ( $\Delta W$ ):** The Itron 2007 study developed  $\Delta kW$  assumptions based on lumens using data from the on-site inspections<sup>1</sup>. Rather than determining a base wattage from which to calculate the  $\Delta kW$  for each bulb, they calculated an average  $\Delta kW$  for various lumen ranges. That is, a 13W and a 14W CFL of the same luminosity would be assumed to have the same average  $\Delta kW$ . Unfortunately, lamps with output of 1,100 to 2,599 lumens were considered as one category, even though that range includes the lumen output of 75W, 100W, and 150W incandescent bulbs replacements. The study results were used, together with the number of non specialty CFLs from each lumen category sold under the 2006 SCE Residential Upstream Lighting Program to determine a base-wattage assumption. The  $\Delta W$  assumptions were drawn from the study. Using program data, the wattages of all the bulbs in each lumen category were summed to find the average wattage of CFLs in that category. The average wattage was added to the  $\Delta W$  to find a base wattage for each lumen category as shown in the Equation 1.

[Equation 1] 
$$\overline{\Delta W} = \frac{\sum(W_{base} - W_{new})}{n} \rightarrow \overline{W_{base}} = \frac{\sum W_{new}}{n} + \overline{\Delta W} = \overline{W_{new}} + \overline{\Delta W}$$

In addition, the same calculations were done for all of the bulbs in the 1100-2599 lumen range, using weighted averages based on the number of bulbs that were sold under the 2006 program in each category. The results are contained in Table 1:

**Table 1. Base Wattage Assumptions**

<b>Lumen Range</b>	<b>SCE Base Wattage (Energy Star)</b>	<b>Average CFL Wattage (SCE 2006 Program)</b>	<b>SCE Average Delta W</b>	<b>SFEER Delta W</b>	<b>Inferred Base Wattage</b>
0-799	40	9.0	31.0	46.8	55.8
800-1099	60	13.8	46.2	51.3	65.1
1100-1599	75	19.2	55.8	68.5	87.7
1600-2000	100	23.9	76.1	68.5	92.4
2000-2599	150	30.0	120.0	68.5	98.5
1100-2599	96.6	23.2	73.4	68.5	91.7

\*This category is based on weighted averages for the three smaller categories

In each case the ENERGY STAR<sup>®</sup> wattage equivalence used in the DEER report and the program assumptions is more conservative, except for the 1600-1999 and 2000-2599 lumen range. This is most likely due to the fact that such a large lumen range was used. For the grouped 1100-2599 lumen category, the difference between the effective SCE base wattage and the inferred base wattage based on SFEER is 5.3%, well within an expected 10% error bound on the SFEER estimate. This exercise was only meant to demonstrate that the program assumptions, based on ENERGY STAR<sup>®</sup>, are reasonable and somewhat conservative. The survey relied on self-reported data about what light bulb had preceded an existing light bulb, which may not be highly reliable data. This exercise is not meant to support an increase in the base wattage assumption. We recommend maintaining the DEER equivalence over the Itron finding because it is more conservative and more specific to the lumen range of a bulb.

**Net-to-Gross Assumption:** To determine the Net-To-Gross (NTG) ratio, the study relied on surveys of retailers and manufacturers. This was due to the fact that in the telephone survey only 24% of respondents who had purchased CFLs during the program were aware they had received a discount, and so direct self-report data were scarce. This is a characteristic nature of upstream programs where it is difficult to adopt standard end-use-based survey methodologies for determining a net-to-gross ratio. Hence, in the surveys of retailers and manufacturers, the study asked respondents to estimate free-ridership based on their sales data for various retail channels. Although the number of respondents was very small in many cases, we accept this because the respondents represented a large portion of the sales volume in that retail channel. The study found distinct free-ridership rates for different retail channels, and then calculated a weighted average of these based on rebated sales volume during 2004-05. The overall free-ridership for SCE was calculated to be 33%, yielding a .67 NTG for 2004-05. Of the 24% of those surveyed who remembered receiving a discount, 63% were somewhat likely, not very likely, or very unlikely to purchase a CFL in the absence of the discount, and thus demonstrated some influence by the program<sup>6</sup>. This value is close to the value determined by the retailer and manufacturer survey data and we deem that the two different methodologies corroborate one another.

Because the study NTG results are retail channel specific and the Upstream Lighting program retail channel distribution of CFLs has shifted, we calculated the NTG using weights developed from 2006 program data. We calculated weights using proportions of sales volume, dollar amount paid by the utility, and energy savings for the utility. The results are shown in Table 2.

**Table 2. Net-to-Gross Values by Distribution Channel**

Channel	Units	Dollars	kWh	SFEER 04/05	Channel Free-ridership
Big Box	8.5%	6.6%	6.2%	18.0%	75%
Discount	19.2%	20.2%	20.4%	12.0%	3%
Drug	5.5%	5.6%	5.4%	4.0%	41%
Grocery	56.4%	57.4%	57.6%	51.0%	16%
Home Improvement	8.1%	7.8%	8.1%	12.0%	66%
Small Hardware	1.4%	1.3%	1.3%	2.0%	52%
Other	0.9%	0.9%	1.0%	1.0%	38%
Total	100.0%	100.0%	100.0%	100.0%	
Parameter					
Free-ridership	24.8%	23.4%	23.2%	33.4%	
NTG	0.75	0.77	0.77	0.67	

Weighting by dollars or by energy saved yields a slightly higher NTG, but the figures are quite similar and SCE recommends using the **0.75 net to gross ratio** determined using the methodology used in the study. Because the data represent the program as a whole, and not solely the residential data, we are assuming the NTG for the residential and non-residential portions of savings are the same.

**Installation rate:** For the measures in this work paper, Edison has determined that the DEER **Installation Rate of 92%** (0.92) that is used for Express Efficiency-type programs<sup>7</sup> that have limited or no measure verification requirements would be more appropriate for these program measures than the 100 % installation rate for programs with strict measure verification requirements. The 92% installation rate is expected to also account for bulbs that are installed at a later time. There are no EM&V studies available that have yet calculated the future installation and savings for stored bulbs.

**Hours of Operation:** The “SDG&E 2004-05 Express Efficiency Lighting Program Time of Use Study” (RLW Analytics 2007)<sup>8</sup> sought to determine an hours of operation figure for non-residential applications. Unfortunately, because we assume that the non-residential portion of the bulbs purchased through the Residential Upstream Lighting Program tend only to go to specific applications, the general non-residential number was not applicable. RLW did have measurements for the applications we assume, but the sample size was too small (n=1 in one case) to justify a change in program assumptions. Therefore, we recommend retaining the number that was calculated from DEER.

**Effective Useful Life:** We recommend retaining the value of 2.1 years as no new data is available to suggest another value.

**Residential/Non-Residential Split:** Currently there are no studies available that directly measure the proportion of upstream rebated lighting products purchased for commercial use. This work paper assumes 10% of the measure purchased are for commercial applications. To validate this assumption, we used data gathered in a previous manufacture buy-down program. The 1994 Compact Fluorescent Lamp Manufacturers' Rebate Program provided financial incentives directly to CFL manufacturers to sell compact fluorescent equipment in Southern California Edison territory at discounted prices. As part of the program, consumer bounce-back cards collected basic information for the CFL product usage. The bounce back card included a question on use of the purchased product for business or home use. The responses to this question are provided in Table3 as both unweighted and weighted proportions, where the weights are based on the number of CFLs purchased. Two questions were used to calculate the weighted proportions: weighted proportions based on responses to either question on "number of CFL bulbs purchased" (Q7) or "number of CFLs by location used(Q5 a-g)"; and weighted proportions based on "number of bulbs purchased (Q7) where information on location was unknown. Thus column X in Table 3 is based on an amalgam of weight proportions sensitive to location and records that could only be weighted with respect to bulb count.

**Table 3. 1994 CFL Manufacturers Bounce Back Card Survey**

1994 CFL Manufacturer's Bounce Back Card Survey						
Is this Compact Fluorescents Bulb for your home or business?						
Source Question *	Column X: No. of bulbs and bulbs with location		Column Y: No. of bulbs		Column Z: No. of Cards	
	CFL(c)	Wtd.Percent	CFL(b)	Wtd.Percent	CFL(a)	Percent
Business	5,860	16%	122	11%	1,931	10%
Household	30,567	81%	934	86%	16,424	88%
Household/Business	1,350	4%	33	3%	272	1%
TOTAL	37,777		1,089		18,627	
Percent Business		19%		14%		12%
* Column X: Q7- How Many CFLs Purchased or Q5A-Q5G - No. of CFLs in a different location Colum Y: Q7- How Many CFLs Purchased CFL(c) and CFL(b) are weighted counts by number of CFLs purchased.CFL(a) is unweighted count of cards						

As shown in Table 3, at least 12% or as high as 19% bulbs purchased through the Manufacturers' Rebate program were for commercial use, hence supporting the conservative program planning estimate of 10%. Future EM&V study needs to update this proportion for the Upstream lighting program measures assumed to be used in commercial application as well.

**Incandescent Equivalency:** We can validate the CFL to incandescent equivalency assumptions made in this work paper by creating a metric using available data from field observations. This metric is the CFL to incandescent ratio, which tells us the observed relationship between the wattages of CFLs and wattages of incandescent lamps they replaced. The equivalence need not be based on wattage alone but rather can be based on lumen output, as is assumed in this work paper. SCE compared the CFL to incandescent ratio implied by the ENERGY STAR Light

Output Equivalency Table (Section 1.5 below) to the ratio calculated using the results of the KEMA CFL Metering Study<sup>7</sup>(reproduced below for ease of reference). For the ENERGY STAR equivalence, the categories are based on lumen levels; for the CFL Metering Study they are based on incandescent base wattage. In each case, a range of CFL wattages fall into each category and so minimum and maximum values were calculated for each category and the mean was chosen. The weighted average was then calculated based on 2006 program volume for the ENERGY STAR equivalence and from KEMA's reported relative frequency. The aggregated CFL to incandescent ratio from the ENERGY STAR chart is 0.267 and that for the CFL Metering Study was 0.254. This is a difference of 5%. This suggests that the lumen mapping method recommended by ENERGY STAR roughly approximates the wattage matching that KEMA observed in the field.

**Table 4. KEMA CFL Metering Study**  
**Table 5-4**  
**Incandescent Bulbs Replaced by CFLs**

Original Incandescent Wattage	Number of Monitored Fixtures with Replacement CFLs	Percent of Monitored Fixtures	Typical CFL Replacement Wattage
60	250	57%	13-17
75	84	19%	18-22
40	55	12%	9-12
100	53	12%	23-26

**Table 5. Summary of Market Parameters**

MEASURE PARAMETER	EX-ANTE VALUE	REVISED EX-ANTE VALUE
	ENERGY STAR®	
ΔkW	lumen equivalents	No change
Hours of Operation	3,220	3,220
Net-to-Gross Ratio	0.80	0.75
Effective Useful Life	2.1	2.1
In-service Rate	90%	92%

### **1.5 Base Cases for Savings Estimates: Existing and Above Code**

The existing equipment replaced by these measures are incandescent lamps in the range of 15 watts through 500 watts. Base measures are mapped to replacement CFLs as described in Table 6.

**Table 6: Mapping of Base Wattages to CFLs by Lumen Equivalency**

BASE WATTS	LUMEN RANGE		SOURCE
	≤	≥	
≥ 24	0	249	extrapolated
25	250	449	extrapolated
40	450	799	Energy Star®
60	800	1,099	Energy Star®
75	1,100	1,399	Energy Star®
90	1,400	1,599	interpolated
100	1,600	1,999	Energy Star
120	2,000	2,599	interpolated
150	2,600	3,599	Energy Star®
200	3,600	4,599	extrapolated
500	4,600		extrapolated

This table is an expansion of the Energy Star® CFL/Incandescent Equivalency Chart which can be found at [http://www.energystar.gov/index.cfm?c=cfls.pr\\_cfls](http://www.energystar.gov/index.cfm?c=cfls.pr_cfls)<sup>9</sup>, which is also shown in Table 7 for ease of reference.

**Table 7. Energy Star Light Output Equivalency**

LIGHT OUTPUT EQUIVALENCY		
To determine which ENERGY STAR qualified light bulbs will provide the same amount of light as your current incandescent light bulbs, consult the following chart:		
INCANDESCENT LIGHT BULBS	MINIMUM LIGHT OUTPUT	COMMON ENERGY STAR QUALIFIED LIGHT BULBS
WATTS	LUMENS	WATTS
40	450	9-13
60	800	13-15
75	1,100	18-25
100	1,600	23-30
150	2,600	30-52

Table 5-4 of the 2005 CFL Metering Study<sup>10</sup> also provides self-reported base incandescent replacement wattage for various CFL wattages. This is based on self-reported data on the monitored fixtures in the study.

### 1.6 Base Cases and Measure Effective Useful Lives

Measure effective useful lives (EULs) used for these measures are based on those found under MeasureID for D03-801 to D03-818 All Screw-in CFLs –Retail Small located in Table 11-4: Non-Weather Sensitive – Lighting EULs, p.11-8: *2004-2005 Database for Energy Efficiency Resources (DEER) Update Study Final Report, December 2005*<sup>11</sup>.

**Table 8. Non-Weather Sensitive - Lighting EULs (DEER Table 11-4)**

MeasureID	Measure Name	EUL	EUL Source
D03-801 to D03-818	All Screw-in CFLs - Health/Medical - Hospital	0.9	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Health/Medical - Nursing Home	0.9	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Lodging - Hotel	0.9	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Lodging - Motel	0.9	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Restaurant - Fast-Food	1.3	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Grocery	1.4	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Retail - Single-Story Large	1.8	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Retail - 3-Story Large	1.9	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Education - Community College	2.1	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Retail - Small	2.1	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Restaurant - Sit-Down	2.3	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Education - University	2.6	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Manufacturing - Light Industrial	2.8	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Storage - Conditioned	2.8	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Storage - Unconditioned	2.8	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Office - Large	2.9	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Warehouse - Refrigerated	3.1	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Office - Small	3.2	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Education - Secondary School	3.5	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Education - Primary School	5.6	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Lodging - Guest Rooms	7.0	DEER/Metering Study 2005
D03-801 to D03-818	All Screw-in CFLs - Residential	9.4	DEER/Metering Study 2005
D03-819 to D03-837	All pin based CFLs - Commercial Buildings	12.0	SERA Report - May 2005/07-14-05
D03-819 to D03-837	All pin based CFLs - Residential Buildings	16.0	SERA Report - May 2005/07-14-05
D03-838	20W CFL Table Lamp: Residential	16.0	SERA Report - May 2005/07-14-05
D03-839	25W CFL Table Lamp: Residential	16.0	SERA Report - May 2005/07-14-05
D03-840	32W CFL Table Lamp: Residential	16.0	SERA Report - May 2005/07-14-05
D03-841	50W CFL Table Lamp: Residential	16.0	SERA Report - May 2005/07-14-05
D03-842	55W CFL Torchiere: Residential	9.0	CALMAC Report - September 2000
D03-843	70W CFL Torchiere (two LAMPs): Residential	9.0	CALMAC Report - September 2000
D03-844	50W Metal Halide	16.0	CALMAC Report - September 2000
D03-845	75W Metal Halide	16.0	CALMAC Report - September 2000
D03-846	100W Metal Halide	16.0	CALMAC Report - September 2000
D03-847	175W PS Metal Halide	16.0	CALMAC Report - September 2000
D03-848	175W PS Metal Halide	16.0	CALMAC Report - September 2000
D03-849	250W PS Metal Halide	16.0	CALMAC Report - September 2000
D03-850	200W HPS	16.0	CALMAC Report - September 2000
D03-851	180W LPS	16.0	CALMAC Report - September 2000
D03-852	Premium T8 EI Ballast	11.0	SERA Report - May 2005/07-14-05
D03-853	T8 32W Dimming EI Ballast	11.0	SERA Report - May 2005/07-14-05
D03-854	De-lamp from 4', 4 lamp/fixture	11.0	SERA Report - May 2005/07-14-05
D03-855	De-lamp from 8', 4 lamp/fixture	11.0	SERA Report - May 2005/07-14-05
D03-856	Occ-Sensor - Wall box	8.0	CALMAC Report - September 2000
D03-857	Occ-Sensor - Plug loads	10.0	CALMAC Report - September 2000
D03-858	Timeclock:	8.0	CALMAC Report - September 2000
D03-859	Photocell:	8.0	CALMAC Report - September 2000
D03-860	LED Exit Sign (New)	16.0	CALMAC Report - September 2000
D03-861	LED Exit Sign Retrofit Kit	16.0	CALMAC Report - September 2000
D03-862	Electroluminescent Exit Sign (New)	16.0	CALMAC Report - September 2000
D03-863	Electroluminescent Exit Sign Retrofit Kit	16.0	CALMAC Report - September 2000

## 1.7 Net-to-Gross Ratios for Different Program Strategies

Table 9 summarizes all applicable Net-to-Gross ratios for programs that may be used by this measure.

**Table 9. Net-to-Gross Ratios**

Program Approach	NTG
Upstream Non Residential Lighting	0.75

As explained above in Section 1.4 EM&V Market Potential, the Net-to-Gross (NTG) ratio used for these measures is based on Edison's evaluation of actual measure distributions in combination with the methodology outlined in the *2004/2005 Statewide Residential Retrofit Single Family Energy Efficiency Rebate Evaluation*, June 29, 2007.

## Section 2. Calculation Methods

### 2.1 Energy Savings Estimation Methodologies

The annual energy savings formulas follow the calculation methods used in the *2004–2005 Database for Energy Efficiency Resources (DEER) Update Study Final Report, December 2005*<sup>15</sup>, modified to exclude energy and interactive effects as explained in the DEER Difference Analysis section of these work papers found in Section 1.2, specifically:  
[Equation 2]  $\Delta\text{Watts/unit}$ :

The demand difference (watts per unit) is simply the difference between the electric demand of the base unit and the electric demand of the energy efficient unit:

$$\begin{aligned} \Delta\text{Watts/unit} &= \text{Base Watts/unit} - \text{Energy Efficient Unit Watts} \\ \text{Example: } \Delta\text{Watts/unit} &= 100 \text{ Watts/unit} - 54 \text{ Watts / units} = 46 \text{ Watts} \end{aligned}$$

[Equation 3] Annual Energy Savings:

$$\text{Energy Savings [kWh/Unit]} = \frac{(\Delta\text{Watts/unit}) \times (\text{annual hours of operation}) \times (\text{Installation Rate})}{1,000 \text{ Watts / kW}}$$

$$\text{Example: Energy Savings} = \frac{(46 \text{ Watts})(3,226 \text{ annual hour of operation}) \times (0.92 \text{ Installation Rate})}{1,000 \text{ Watt / kW}} = 136.52 \text{ kWh}$$

**Annual hours of operation:** The DEER Report employs a methodology that is oriented toward using operating hours for specific market sectors when calculating energy and demand impacts. However, at this time there is insufficient data to determine specific allocation of measures to specific market sectors. It is however generally understood that the primary nonresidential participants in this program are small businesses. Accordingly, SCE uses a simple average of the annual operating hours for small retail, small office, and sit-down restaurants. The annual hours of operation used in this work paper are based on a simple average of the DEER operating hours for three building types that are considered to be the primary participants in this program: small retail, small office, and sit-down restaurants. The operating hours are obtained from *Table 3-2: Annual Lighting Hours, energy and demand Diversity Factors, and Coincident Diversity Factors by Building Type for CFL Lighting*<sup>16</sup>. Current assumptions are that the most likely participants in this program will be the owners and operators of small businesses. The market sectors that most closely represent this general category are small offices, sit-down restaurants, and small retail establishments. A simple average of these market segments was calculated as follows:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i = \frac{1}{n} (x_1 + \cdots + x_n).$$

[Equation 4]

$$3226 \text{ average operating hours} = (2,492 \text{ office-small} + 3,444 \text{ restaurant-sit down} + 3,742 \text{ retail-small})/3 \text{ observations}$$

## 2.2 Demand Reduction Estimation Methodologies

The demand reduction formulas follow the calculation methods used in the *2004–2005 Database for Energy Efficiency Resources (DEER) Update Study Final Report, December 2005*<sup>12</sup>, on page 3-6, modified to exclude energy and interactive effects, as explained in the DEER Difference Analysis section of these work papers, found in Section 1.2, specifically:

[Equation 5]  $\Delta\text{Watts/unit}$ :

The demand difference (watts per unit) is simply the difference between the electric demand of the base unit and the electric demand of the energy efficient unit.

$$\Delta\text{Watts/unit} = \text{Base Watts/unit} - \text{Energy Efficient Unit Watts}$$

Example:  $\Delta\text{Watts/unit} = 100 \text{ Watts/unit} - 54 \text{ Watts / units} = 46 \text{ Watts}$

[Equation 6] Demand Reduction:

$$\text{Demand Reduction [kW/Unit]} = (\Delta\text{Watts/unit}) \times (\text{Installation Rate}) \times (\text{Peak Coincidence Factor}) \\ 1,000 \text{ Watts s/ kW}$$

Example:  $\text{Demand Reduction} = (46 \text{ Watts} \times (0.92) \times (0.79)) / 1,000 \text{ Watt s /kW} = 0.03343 \text{ kW}$

**Coincident Diversity Factors:** Section 3, the non residential section of the 2004-2005 Database for Energy Efficiency Resources (DEER) Update Study, uses a coincident diversity factor in place of the peak load share used in the residential section to calculate the portion of energy demand produced by a lighting measure that occurs during an on peak period. For reasons elaborated on in the above discussion on hours of operation, the Coincident Diversity Factors used in this work paper are based on a simple average of the DEER coincident diversity factors for the same three building types: small retail, small office, and sit-down restaurants, which are considered to be the primary participants in this program. These factors were obtained from *Table 3-2: Annual Lighting Hours, Energy and Demand Diversity Factors, and Coincident Diversity Factors by Building Type for CFL Lighting*<sup>13</sup>. Using the same formula as cited above for the calculation of average operating hours, an average coincident factor is calculated as follows.

$$0.79 \text{ Coincident Diversity Factor} = (0.81 \text{ office-small} + 0.68 \text{ restaurant-sit down} + 0.88 \text{ retail-small}) / 3 \text{ observations}$$

In all cases, the values were extracted directly from Table 3-2, which is reproduced below.

**Table 10. Annual Lighting Hours and Demand Diversity Factors, and Coincident Diversity Factors by Building Type for CFL Lighting (DEER Table 3-2)**

Market Sector	Annual Operating Hours	Energy Interactive Effects	Coincident Diversity Factors	Demand Interactive Effects
Education - Primary School	1,440	1.15	0.42	1.23
Education - Secondary School	2,305	1.15	0.42	1.23
Education - Community College	3,792	1.15	0.68	1.22
Education - University	3,073	1.15	0.68	1.22
Grocery	5,824	1.13	0.81	1.25
Health/Medical - Hospital	8,736	1.18	0.74	1.26
Health/Medical - Clinic	8,736	1.18	0.74	1.26
Lodging - Hotel	8,736	1.14	0.67	1.14
Lodging - Motel	8,736	1.14	0.67	1.14
Lodging - Guest Rooms	1,145*	1.14	0.67	1.14
Manufacturing - Light Industrial	2,860	1.04	0.99	1.08
Office - Large	2,739*	1.17	0.81	1.25
Office - Small	2,492*	1.17	0.81	1.25
Restaurant - Sit-Down	3,444*	1.15	0.68	1.26
Restaurant - Fast-Food	6,188	1.15	0.68	1.26
Retail - 3-Story Large	4,259	1.11	0.88	1.19
Retail - Single-Story Large	4,368	1.11	0.88	1.19
Retail - Small	3,724*	1.11	0.88	1.19
Storage - Conditioned	2,860	1.06	0.84	1.09
Storage - Unconditioned	2,860	1.06	0.84	1.09
Warehouse - Refrigerated	2,600	1.06	0.84	1.09

\* Different from the values used in Table 3-5

## Section 3 Load Shapes

Load Shapes are a graphic representation of electrical load over a period of time and are an important part of the life-cycle cost analysis of any energy efficiency program portfolio. The net benefits associated with a measure are based on the amount of energy saved and the avoided cost per unit of energy saved. For electricity, the avoided cost varies hourly over an entire year. Thus, the net benefits calculation for a measure requires both the total annual energy savings (kWh) of the measure and the distribution of that savings over the year. The distribution of savings over the year is represented by the measure's load shape. The measure's load shape indicates what fraction of annual energy savings occurs in each time period of the year. An hourly load shape indicates what fraction of annual savings occurs for each hour of the year. A Time-of-Use (TOU) load shape indicates what fraction occurs within five or six broad time-of-use periods, typically defined by a specific utility rate tariff. Formally, a load shape is a set of fractions summing to unity, one fraction for each hour or for each TOU period. Multiplying the measure load shape with the hourly avoided cost stream determines the average avoided cost per kWh for use in the life cycle cost analysis that determines a measure's total resource cost (TRC) benefit.

### **3.1 Base Cases Load Shapes**

The base case indoor lighting system's demand would be expected to follow an indoor lighting end-use load shape for each market sector as shown in the E3 Calculator.

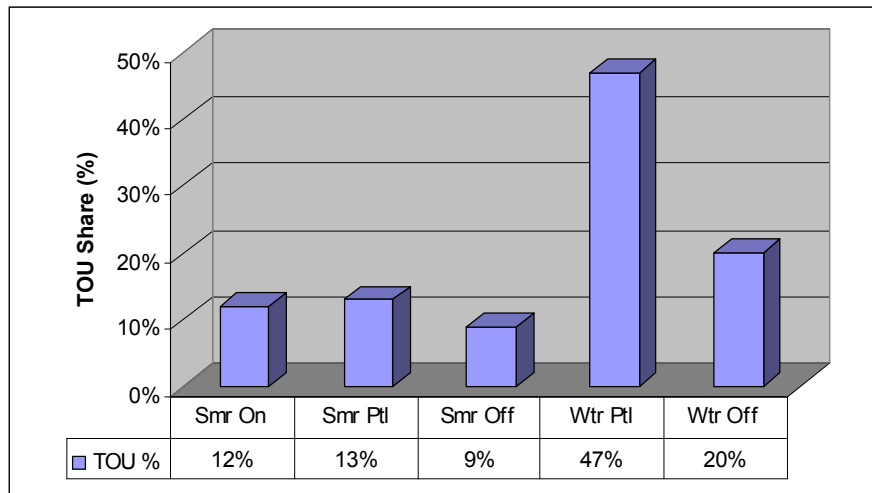
### **3.2 Measure Load Shapes**

For purposes of the net benefits estimates in the E3 calculator, what is required is the demand load shape that ideally represents the *difference* between the base equipment and the installed energy efficiency measure. This *difference* load profile is what is called the Measure Load Shape and would be the preferred load shape for use in the net benefits calculations. The measure equipment and controls may alter the typical commercial indoor lighting hourly demand profile differently, making it difficult to select a single demand profile to represent the category. The commercial indoor lighting measures demand profile under this Direct Install measure category (fluorescent lighting system) is expected to be slightly lower when compared to the base system.

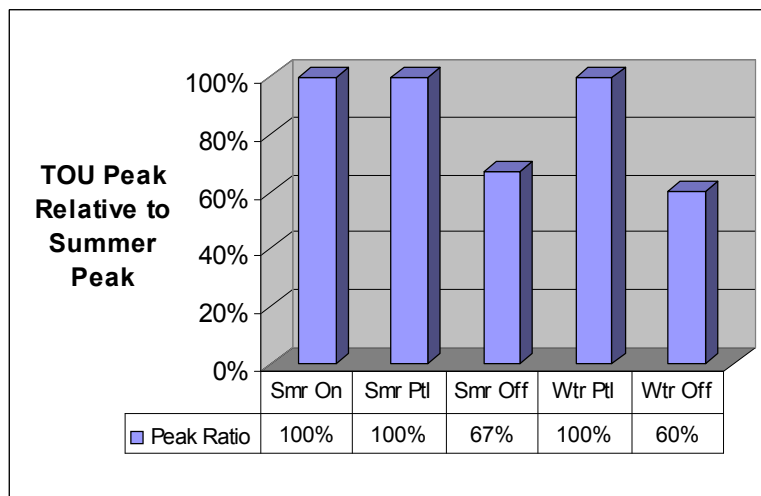
The Load Shape Update Initiative Study determined that for load-following measures, the end-use load shape can be substituted for the measure shape:

“It can be argued that for measures that are roughly load-following (have a similar pattern to the end-use itself), substituting the end-use load shape for the measure shape is a reasonable simplification. Errors introduced by this substitution may be minor compared to other uncertainties in the savings valuation process. Distinguishing measure shape from end-use shape may be an unnecessary complication except for measures that are not load-following. This perspective was suggested by some workshop participants and interviewees.”<sup>14</sup>

The E3 Calculator contains a fixed set of load shapes selections that are the combination of the hourly avoided costs and whatever load shape data were available at the time of the tool's creation. In the case of SCE's E3 Calculator, the majority of the load shape data at the time were TOU End Use load shapes and not Hourly Measure load shapes. Figure 1 and Figure 2 represent the TOU End Use Energy and Peak Demand factors for indoor lighting measures that are embedded within the SCE E3 Calculator.



**Figure 1. TOU energy Factors - Indoor Lighting End Use**



**Figure 2. TOU Demand Factors - Indoor Lighting End Use**

In the E3 Calculator, for the “Measure Electric End Use Shape” selection, the “Indoor Lighting” (Indoor LT) load shape is the only appropriate selection for the Commercial Indoor Lighting System Replacement measure category. The “Indoor Lighting” selection is enabled for most of the nonresidential Target Sectors in Version 3c3-2000 of the E3 Calculator. The exceptions are:

- Grocery Store, select Food Store to enable the IndoorLT load shape,
- Fast Food Restaurant, select Restaurant to enable the IndoorLT load shape,
- Sit Down Restaurant, select Restaurant to enable the IndoorLT load shape,
- Storage Building, select Non-Refrigerated Warehouse to enable the IndoorLT load shape,
- School, select K-12 School to enable the IndoorLT load shape, and
- Assembly, select Miscellaneous Commercial to enable the IndoorLT load shape.

## **Section 4. Base Case and Measure Costs**

Measure costs were obtained directly from Table C-4: DEER Non-Weather Sensitive Measure List, in most instances. As explained in section 4.3 below, for certain measures that were not represented in the DEER tables, lamp wattages were extrapolated to match available cost data.

### **4.1 Base Cases Costs**

Base equipment costs were obtained from the DEER for this work paper as listed in Table 11 below.

### **4.2 Measure Costs**

For screw-in compact fluorescent lamps, measure costs were extracted from the *2004-2005 Database for Energy Efficiency Resources (DEER) Update Study Final Report, Appendix C, Table C-4 DEER Non – Weather Sensitive Measure List*<sup>15</sup>. Wattages of CFLs measures were matched to those in the DEER table and the incremental measure costs were used as presented in the table. In instances where direct mappings of wattages were not possible, costs from the closest available DEER wattages were used. For example, Table C-4 in DEER did not have costs for a 9 Watt, 10 Watt, or 11 Watt CFLs. The first available costs in the DEER table were for a 13 Watt CFL. So the costs presented for the 13 Watt CFLs were used for the 9, 10, and 11 watt CFLs. Using the above example, 9 Watt, 10 Watt, 11 Watt, and 13 Watt CFLs would all be priced at the next available cost of \$4.98/unit.

### **4.3 Incremental and Full Measure Costs**

For screw-in compact fluorescent lamps, incremental costs were extracted from the *2004-2005 Database for Energy Efficiency Resources (DEER) Update Study Final Report, Appendix C, Table C-4 DEER Non – Weather Sensitive Measure List*<sup>20</sup>. Wattages of CFLs measures were matched to those in the DEER table and the incremental measure costs were used as presented. In instances where direct mappings of wattages were not possible, costs from the closest available DEER wattages were used. For example, Table C-4 in DEER did not have costs for a 9 Watt, 10 Watt, or 11 Watt CFLs. The first available costs in the DEER table were for a 13 Watt CFL. Therefore, the costs presented for the 13 Watt CFLs were used for the 9, 10, and 11 watt CFLs. Using the above example, 9 Watt, 10 Watt, 11 Watt, and 13 Watt CFLs would all be priced at the next available cost of \$4.40/unit.

Installation costs were not used for these measures for the following reason: the participants in this non residential program are most likely small business owners that would install these units as part of their normal maintenance routines and not incur any additional expense over and above the level of effort in replacing a standard incandescent lamp. An argument could be made that due to the longer life on CFLs, those installations would occur less frequently and that an installation credit due to the reduced frequency of replacement could be easily calculated. However, SCE has decided not to calculate and claim an installation credit at this time.

**Table 11. DEER Non-Weather Sensitive Measure List (DEER Table C-4)**

MeasureID	Measure Name	Energy Common Units	Cost Common Units	Base Equipment Cost (\$)	Measure Equipment Cost (\$)	Incremental Equipment Cost (\$)	Labor Cost (\$)	Installed Cost (\$)
D03-801	13 Watt CFL < 800 Lumens - screw-in	LAMP	Lamp	\$0.57	\$4.98	\$4.40	\$3.77	\$8.18
D03-802	13 Watt CFL =800 Lumens - screw-in	LAMP	Lamp	\$0.61	\$4.87	\$4.26	\$3.77	\$8.04
D03-803	14 Watt CFL - screw-in	LAMP	Lamp	\$0.61	\$5.25	\$4.64	\$3.77	\$8.41
D03-804	15 Watt CFL - screw-in	LAMP	Lamp	\$0.61	\$5.62	\$5.01	\$3.77	\$8.79
D03-805	16 Watt CFL - screw-in	LAMP	Lamp	\$0.61	\$6.00	\$5.39	\$3.77	\$9.16
D03-806	18 Watt CFL < 1,100 Lumens - screw-in	LAMP	Lamp	\$0.61	\$6.74	\$6.14	\$3.77	\$9.91
D03-807	18 Watt CFL =1,100 Lumens - screw-in	LAMP	Lamp	\$0.61	\$6.37	\$5.77	\$3.77	\$9.54
D03-808	19 Watt CFL =1,100 Lumens - screw-in	LAMP	Lamp	\$0.61	\$6.73	\$6.12	\$3.77	\$9.89
D03-809	20 Watt CFL - screw-in	LAMP	Lamp	\$0.61	\$7.08	\$6.47	\$3.77	\$10.25
D03-810	23 Watt CFL - screw-in	LAMP	Lamp	\$0.61	\$6.66	\$6.05	\$3.77	\$9.82
D03-811	25 Watt CFL <1,600 Lumens - screw-in	LAMP	Lamp	\$0.61	\$8.85	\$8.24	\$3.77	\$12.02
D03-812	25 Watt CFL =1,600 Lumens - screw-in	LAMP	Lamp	\$0.61	\$7.24	\$6.63	\$3.77	\$10.40
D03-813	26 Watt CFL <1,600 Lumens - screw-in	LAMP	Lamp	\$0.61	\$9.21	\$8.60	\$3.77	\$12.37
D03-814	26 Watt CFL =1,600 Lumens - screw-in	LAMP	Lamp	\$0.61	\$7.52	\$6.92	\$3.77	\$10.69
D03-815	28 Watt CFL - screw-in	LAMP	Lamp	\$0.61	\$8.10	\$7.50	\$3.77	\$11.27
D03-816	30 Watt CFL - screw-in	LAMP	Lamp	\$0.61	\$9.26	\$8.65	\$3.77	\$12.43
D03-817	36 Watt CFL - screw-in	LAMP	Lamp	\$2.22	\$9.19	\$6.97	\$3.77	\$10.75
D03-818	40 Watt CFL - screw-in	LAMP	Lamp	\$2.22	\$12.77	\$10.55	\$3.77	\$14.32
D03-819	13 Watt CFL < 800 Lumens - pin based	LAMP	Lamp	\$0.00	\$17.88	\$0.00	\$27.14	\$45.02
D03-820	13 Watt CFL =800 Lumens - pin based	LAMP	Lamp	\$0.00	\$17.88	\$0.00	\$27.14	\$45.02
D03-821	14 Watt CFL - pin based	LAMP	Lamp	\$0.00	\$18.38	\$0.00	\$27.14	\$45.51
D03-822	15 Watt CFL - pin based	LAMP	Lamp	\$0.00	\$18.87	\$0.00	\$27.14	\$46.01
D03-823	16 Watt CFL - pin based	LAMP	Lamp	\$0.00	\$19.36	\$0.00	\$27.14	\$46.50
D03-824	18 Watt CFL < 1,100 Lumens - pin based	LAMP	Lamp	\$0.00	\$20.35	\$0.00	\$27.14	\$47.49
D03-825	18 Watt CFL =1,100 Lumens - pin based	LAMP	Lamp	\$0.00	\$20.35	\$0.00	\$27.14	\$47.49
D03-826	19 Watt CFL =1,100 Lumens - pin based	LAMP	Lamp	\$0.00	\$20.84	\$0.00	\$27.14	\$47.98
D03-827	20 Watt CFL - pin based	LAMP	Lamp	\$0.00	\$21.34	\$0.00	\$27.14	\$48.48
D03-828	23 Watt CFL - pin based	LAMP	Lamp	\$0.00	\$22.82	\$0.00	\$27.14	\$49.96
D03-829	25 Watt CFL <1,600 Lumens - pin based	LAMP	Lamp	\$0.00	\$23.80	\$0.00	\$27.14	\$50.94
D03-830	25 Watt CFL =1,600 Lumens - pin based	LAMP	Lamp	\$0.00	\$23.80	\$0.00	\$27.14	\$50.94
D03-831	26 Watt CFL <1,600 Lumens - pin based	LAMP	Lamp	\$0.00	\$24.30	\$0.00	\$27.14	\$51.44
D03-832	26 Watt CFL =1,600 Lumens - pin based	LAMP	Lamp	\$0.00	\$24.30	\$0.00	\$27.14	\$51.44
D03-833	28 Watt CFL - pin based	LAMP	Lamp	\$0.00	\$25.28	\$0.00	\$27.14	\$52.42
D03-834	30 Watt CFL - pin based	LAMP	Lamp	\$0.00	\$26.27	\$0.00	\$27.14	\$53.41
D03-835	40 Watt CFL - pin based	LAMP	Lamp	\$0.00	\$31.20	\$0.00	\$27.14	\$58.34
D03-836	55 Watt CFL - pin based	LAMP	Lamp	\$0.00	\$38.60	\$0.00	\$27.14	\$65.74
D03-837	65 Watt CFL - pin based	LAMP	Lamp	\$0.00	\$43.54	\$0.00	\$27.14	\$70.68
D03-838	20W CFL Table Lamp	Fixture	Fixture	\$50.43	\$50.43	\$0.00	\$0.00	\$0.00
D03-839	25W CFL Table Lamp	Fixture	Fixture	\$61.13	\$61.13	\$0.00	\$0.00	\$0.00
D03-840	32W CFL Table Lamp	Fixture	Fixture	\$63.20	\$63.20	\$0.00	\$0.00	\$0.00
D03-841	50W CFL Table Lamp	Fixture	Fixture	\$122.96	\$122.96	\$0.00	\$0.00	\$0.00
D03-842	55W CFL Torchiere	Fixture	Torchiere	\$59.39	\$59.39	\$0.00	\$0.00	\$0.00
D03-843	70W CFL Torchiere (two LAMPs)	Fixture	Torchiere	\$55.76	\$55.76	\$0.00	\$0.00	\$0.00
D03-844	50W Metal Halide	Fixture	Fixture	\$0.00	\$113.85	\$0.00	\$100.51	\$214.36
D03-845	75W Metal Halide	Fixture	Fixture	\$0.00	\$120.09	\$0.00	\$100.51	\$220.60
D03-846	100W Metal Halide	Fixture	Fixture	\$0.00	\$126.66	\$0.00	\$100.51	\$227.17
D03-847	175W PS Metal Halide	Fixture	Fixture	\$0.00	\$129.01	\$0.00	\$67.84	\$196.86
D03-848	175W PS Metal Halide	Fixture	Fixture	\$0.00	\$129.01	\$0.00	\$67.84	\$196.86
D03-849	250W PS Metal Halide	Fixture	Fixture	\$0.00	\$152.08	\$0.00	\$67.84	\$219.92
D03-850	200W HPS	Fixture	Fixture	\$0.00	\$91.05	\$0.00	\$67.84	\$158.89
D03-851	180W LPS	Fixture	Fixture	\$0.00	\$74.62	\$0.00	\$67.84	\$142.46
D03-852	Premium T8 El Ballast	Fixture	Fixture	\$19.23	\$23.42	\$4.19	\$0.00	\$0.00
D03-853	T8 32W Dimming El Ballast	Fixture	Fixture	\$16.54	\$72.89	\$56.34	\$16.96	\$89.85
D03-854	De-lamp from 4', 4 lamp/fixture	Fixture	Fixture	\$0.00	\$3.08	\$0.00	\$22.63	\$25.71
D03-855	De-lamp from 8', 4 lamp/fixture	Fixture	Fixture	\$0.00	\$3.28	\$0.00	\$22.63	\$25.91
D03-856	Occ-Sensor - Wall box	Sensor	Sensor	\$0.00	\$42.28	\$0.00	\$35.00	\$77.28
D03-857	Occ-Sensor - Plug loads	Sensor	Sensor	\$0.00	\$82.25	\$0.00	\$35.00	\$117.25
D03-858	Timeclock:	Timeclock	Timeclock	\$0.00	\$123.01	\$0.00	\$116.88	\$239.89
D03-859	Photocell:	Photocell	Photocell	\$0.00	\$12.06	\$0.00	\$47.75	\$59.81
D03-860	LED Exit Sign (New)	Exit Sign	Sign	\$0.00	\$31.52	\$0.00	\$33.92	\$65.44
D03-861	LED Exit Sign Retrofit Kit	Exit Sign	Sign	\$0.00	\$16.66	\$0.00	\$33.92	\$50.58
D03-862	Electroluminescent Exit Sign (New)	Exit Sign	Sign	\$0.00	\$73.42	\$0.00	\$33.92	\$107.34
D03-863	Electroluminescent Exit Sign Retrofit Kit	Exit Sign	Sign	\$0.00	\$70.14	\$0.00	\$33.92	\$104.06
D03-901	High Efficiency Copier	Copier Machine	copier	\$1,616.38	\$1,773.14	\$156.76	\$0.00	\$0.00
D03-902	High Efficiency Copier	Copier Machine	copier	\$4,686.00	\$7,654.69	\$2,968.69	\$0.00	\$0.00
D03-903	High Efficiency Copier	Copier Machine	copier	\$0.00	\$10,924.63	\$0.00	\$0.00	\$0.00
D03-904	High Efficiency Gas Fryer	Fryer	Fryer	\$1,520.61	\$4,103.15	\$2,582.54	\$0.00	\$0.00
D03-905	High Efficiency Gas Griddle	Griddle	Griddle	\$1,758.36	\$3,860.67	\$2,102.31	\$0.00	\$0.00
D03-906	High Efficiency Electric Fryer	Fryer	Fryer	\$3,326.73	\$12,088.62	\$8,761.89	\$0.00	\$0.00
D03-907	Hot Food Holding Cabinet	Cabinet	Cabinet	\$1,545.67	\$2,589.81	\$1,044.13	\$0.00	\$0.00
D03-908	Connectionless Steamer	Steamer	Steamer	\$5,128.24	\$3,206.64	-\$1,921.61	\$0.00	\$0.00
D03-909	Point of Use Water Heat	1000 sqft building	WtrHtr	\$492.96	\$863.60	\$370.64	\$250.90	\$1,114.50

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## Attachments

Attachment 1. Non-Residential CFL Integral Screw-In Fixtures Worksheet.



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- <sup>1</sup> Itron, Inc., JJ Hirsch & Associates, Synergy Consulting, and Quantum, Inc., “2004-2005 Database for Energy Efficiency Resources (DEER) Update Study Final Report,” December 2005, 3-1 through 3-13
- <sup>2</sup> Ibid., 3-6,3-7.
- <sup>3</sup> Ibid., 3-5.
- <sup>4</sup> Ibid., 11-8.
- <sup>5</sup> Itron, Inc.,2004/2005 Statewide Residential Retrofit Single Family Energy Efficiency Rebate Evaluation, June 29, 2007.
- <sup>6</sup> Itron 2007, 5-23
- <sup>7</sup> KEMA, CFL Metering Study Final Report, February 25, 2005, 5-3
- <sup>8</sup> RLW Analytics, SDG&E 2004-05 Express Efficiency Lighting Program Time of Use Study
- <sup>9</sup> Energy Star® CFL/Incandescent Equivalency Chart which can be found at [http://www.energystar.gov/index.cfm?c=cfls.pr\\_cfls](http://www.energystar.gov/index.cfm?c=cfls.pr_cfls)
- <sup>10</sup> KEMA 2005, 5-3.
- <sup>11</sup> Itron 2005, 11-8.
- <sup>12</sup> Itron 2005, 3-6.
- <sup>13</sup> Ibid 2005, 3-5.
- <sup>14</sup> KEMA, Final Report Load Shape Initiative, Revised November 17, 2006.
- <sup>15</sup> Ibid., C-5